U.S. Patent Application Serial No. 10/658,743
Response filed September 30, 2005
Reply to OA dated July 12, 2005

AMENDMENTS TO THE SPECIFICATION:

Amend the specification as follows:

Please replace the paragraph bridging pages 2 and 3 (line 13, page 2 through line 1, page 3), with the following rewritten paragraph:

A hydraulic shovel mounts an engine having an output which coincides with the largest necessary horsepower in a case that a vehicle performs a work, that is, such an engine that the rating output point PH of the engine torque curve coincides with the largest necessary horsepower curve L shown in Fig. 4. Recently, there are demands for miniaturizing the engine so as to reduce increase fuel efficiency. In this case, when the engine is simply miniaturized, there may arise a case that the necessary driving torque is not achieved in the hydraulic pump even when the capacity of the engine is 100% used. Therefore, restrictions (provisions) are provided referring with respect to the miniaturization of engines[[,]] so that the miniaturization has not been able to be planned boldly aggressively taken place.

Please replace the paragraph beginning on page 4, line 9 with the following rewritten paragraph:

In the case of a high-load mode (high-load state) where the necessary driving torque in the hydraulic pump is larger than that of the rating output point of the engine, that is, in the case that the driving torque needs the torque T4 at the point D, it is accommodated by adding the torque in short

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(T4 - T3) to the torque T3 by the engine at the point C. The fuel-consumption efficiency of this case

exhibits the highest fuel-consumption rate in the curve 7.

Please replace the paragraph bridging pages 5 and 6 (line 16, page 5 through line 7, page 6), with the following rewritten paragraph:

Construction machinery according to ~~claim 1 of~~ the present invention comprises: an engine

1; a hydraulic pump 4 driven by the engine 1; and actuators 6 driven by pressure oil supplied from

the hydraulic pump 4. In the case of a load mode where the engine torque at the intersection point

of the iso-horsepower curve of the necessary horsepower and the governor characteristic curve of

the engine 1 is smaller than that of the rating output point of the engine 1, the number of revolutions

of the engine is reduced and the engine torque is increased with reference to the intersection point,

and the engine is allowed to run with a horsepower <u>that</u> exceeds the iso-horsepower curve. With the

surplus torque generated therefrom, a power generator is operated so as to generate an electric power,

and the generated electric power is accumulated in a power accumulation apparatus 12.

Please replace the paragraph beginning on page 6, line 8 with the following rewritten paragraph:

According to the construction machinery ~~as claimed in claim 1~~ <u>of this invention</u>, in the load

mode where the engine torque at the intersection point of the iso-horsepower curve of the necessary

horsepower and the governor characteristic curve of the engine 1 is smaller than that of the rating

output point of the engine 1, the number of revolutions of the engine is reduced, the engine torque

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is increased, and the engine is allowed to run with a horsepower exceeding the iso-horsepower curve.

Therefore, the fuel consumption rate may usually be improved. This may provide excellent fuel

consumption rate, so that the cost reduction can be achieved. Further, the power generator 11 is

operated so as to generate electric power by the surplus torque, so that the generated electric power

is accumulated in the power accumulation apparatus 12. With this structure, the surplus torque is

effectively utilized and the machinery is ~~excellent in economy~~ highly economical.

Please replace the paragraph bridging pages 6 and 7 (line 25, page 6 through line 8,

page 7), with the following rewritten paragraph:

Construction machinery ~~according to claim 2~~ of this invention has a characteristic that, in the

case of a load mode where the iso-horsepower curve of the necessary horsepower and the governor

characteristic curve of the engine 1 do not generate an intersection point, the engine 1 is driven at

a point approximate to the rating output point while the power generator functioning as an electric

motor is operated by the power accumulation apparatus 12, so that assist running for assisting the

shortage is performed.

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Please replace the paragraph bridging pages 7 and 8 (line 9, page 7 through line 6, page 8), with the following rewritten paragraph:

According to the construction machinery ~~as claimed in claim 2~~ of this invention, in the load mode where the iso-horsepower curve of the necessary horsepower and the governor characteristic curve of the engine 1 do not generate an intersection point, the engine 1 is driven at a point approximate to the rating output point while the power generator functioning as an electric motor is operated. Therefore, the necessary driving torque can be generated in the hydraulic pump 4, so that works corresponding to this load (for example, an excavation when the construction machinery is an hydraulic shovel) can be performed. Further, since the engine runs at a point approximate to the rating output point, shortage of the torque with reference to the necessary torque is ~~a little~~ small. ~~Thereby~~ Thus, the power generator 11 functioning as an electric motor and the power accumulation apparatus 12 can be miniaturized. Moreover, the operation of the power generator 11 can surely generate the torque for the shortage, so that the works corresponding to the high-load can be surely performed. Further, a driving torque necessary for the hydraulic pump 4 is not generated by the engine 1 alone in the case of the high-load mode. Therefore, it is possible to miniaturize the engine 1 and to achieve the reduced fuel consumption rate.

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Please replace the paragraph beginning on page 8, line 7 with the following rewritten paragraph:

Construction machinery ~~according to claim 3~~ of this invention has a characteristic that the power accumulation is performed with the number of revolutions by which the power generator is to be in the high efficiency state.

Please replace the paragraph beginning on page 8, line 11 with the following rewritten paragraph:

In the construction machinery ~~according to claim 3~~ of this invention, the power accumulation is performed with the number of revolutions by which the power generator is to be in the high efficiency state, so that the power accumulation can be performed efficiently.

Please replace the paragraph beginning on page 8, line 16 with the following rewritten paragraph:

Construction machinery ~~according to claim 4~~ of this invention has a characteristic that assist running is performed with the number of revolutions by which the power generator functioning as an electric motor is to be in the high efficiency state.

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Please replace the paragraph beginning on page 8, line 21 with the following rewritten

paragraph:

In the construction machinery ~~according to claim 4~~ of this invention, the assist running is

performed with the number of revolutions by which the power generator functioning as an electric

motor is to be in the high efficiency state, so that the assisting torque can be generated efficiently.

Please replace the paragraph beginning on page 12, line 4 with the following rewritten

paragraph:

In a case that coordinates are drawn in which the engine speed (number of revolutions) is laid

on the abscissa axis and the engine torque is laid on the ordinate axis, as shown in Fig. 1, curves

representing the ~~iso-fuel~~ iso-fuel consumption rate are shown as curves a, b, c, d, e, f or the like, and

the iso-horsepower curves are shown as curves L1, L2, L3 or the like. The ~~iso-fuel~~ iso-fuel

consumption rate curves are improved as moving from the curve a to the curve f. That is, the best

point X exists in the curve f. In this case, the ~~iso-fuel~~ iso-fuel consumption rate means an amount

of fuel consumed per unit output within a unit time, as shown as g/PS•h. Further, in Fig. 1, the

numeral 15 denotes a governor characteristic curve showing the limit of the controllable range of a

governor controlling the engine speed. The outside of the governor characteristic curve 15 does not

exist actually.

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Please replace the paragraph bridging pages 12 and 13 (line 20, page 12 through line 15, page 13), with the following rewritten paragraph:

In the case of, for example, the light-load mode in which the arm, the bucket ~~and~~ or the like oscillate, that is, a case that only 80% of the capacity with reference to the horsepower capacity of the engine 1 are needed and the ~~iso-horsepower~~ iso-horsepower curve of the necessary horsepower is the curve L3, while the torque at the intersection point of the governor characteristic curve 15 and the iso-horsepower curve L3 ~~smaller than that of the rating~~ (indicated at point A0) is less than the torque at the rated output point of the engine 1, the number of revolutions of the engine is reduced, from that at A0 to that at A1, than the intersection point and the driving torque [[is]] are increased, and the horsepower is made to exceed the iso-horsepower curve L3. In this way, the fuel consumption ~~rate (fuel consumption~~ efficiency[[)]] of the engine 1 can be increased. In this case, the torque is increased from that at the point A1 to that at the point B1 which is approximate to the best fuel consumption efficiency point X. That is, the torque at B1, which is [[larger]] greater than the ~~driving torque D1~~ necessary [[on the]] driving torque at D1 on the iso-horsepower curve L3, is [[to be]] generated. ~~Therefore, the~~ The difference between the torque at the point B1 and the point D1 is used as the surplus torque so as to operate the power generator 11. Thereby, the battery 12 is charged.

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     Please replace the paragraph beginning on page 16, line 12 with the following rewritten paragraph:

     In the aforementioned construction machinery, in the case of the light-load mode (a mode in which the engine torque at the intersection point of the iso-horsepower curve of the necessary horsepower and the governor characteristic curve of the engine 1 is smaller than that of the rating output point of the engine 1), the excellent fuel consumption rate can be exhibited by ~~performing a run~~ operating the engine for increasing the fuel consumption efficiency, so that a sharp cost reduction can be achieved. Further, the construction machinery operates the power generator so as to generate electric power by the surplus torque generated, and charges the generated electric power in the battery 12. This can effectively utilize the surplus torque and is ~~excellent in economy~~ highly economical.